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# Regulating knowledge monopolies: the case of the IPCC

Richard S. J. Tol

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**Abstract** The Intergovernmental Panel on Climate Change has a monopoly on the provision of climate policy advice at the international level and a strong market position in national policy advice. This may have been the intention of the founders of the IPCC. I argue that the IPCC has a natural monopoly, as a new entrant would have to invest time and effort over a longer period to perhaps match the reputation, trust, goodwill, and network of the IPCC. The IPCC is a not-for-profit organization, and it is run by nominal volunteers. It therefore cannot engage in the price-gouging that is typical of monopolies. However, the IPCC has certainly taken up tasks outside its mandate. The IPCC has been accused of haughtiness. Innovation is slow. Quality may have declined. And the IPCC may have used its power to hinder competitors. There are all things that monopolies tend to do, against the public interest. The IPCC would perform better if it were regulated by an independent body which audits the IPCC procedures and assesses its performance; if outside organizations would be allowed to bid for the production of reports and the provision of services under the IPCC brand; and if policy makers would encourage potential competitors to the IPCC.

## 1 Introduction

The Intergovernmental Panel on Climate Change (IPCC) is a runaway success. From humble beginnings in the late 1980s, it is now seen by many national and subnational governments as the ultimate authority on scientific matters on climate change (Agrawala

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1998a; Agrawala 1998b; Hulme and Mahony 2010; Nishioka 2008; Oppenheimer et al. 2007; Rothman et al. 2009). The IPCC was awarded the Nobel Peace Prize 2007. However, there has been criticism of the IPCC from November 2009 onwards (Economist 2011; Hulme 2010; Kintisch 2010; McKittrick 2010; Nature 2010; New Scientist 2010; Rosenthal 2010; Schiermeier 2010; The Economist 2010c; Wynne 2010), the sharpness of which dwarfs earlier critique. This is to a large extent because of political opposition to climate policy,<sup>1</sup> but I argue below that there are design flaws in the IPCC as well. I also offer remedies.

Climate change succeeded acidification. Many academics and policy makers who used to work on acid rain moved to climate change when acidification was “solved”. Some argue that the negotiations on acidifying substances did not succeed until after all parties had accepted a common, scientific understanding of the problem. International acidification policy is indeed informed by a single body of technocratic advice<sup>2</sup>—a knowledge monopoly (Castells and Funtowicz 1997; Gough et al. 1998; Hordijk 1991; Hordijk 1995; Hordijk and Kroeze 1997). The formation of the IPCC was at least partly inspired by this example.

Note that there is no reason to assume that knowledge monopolies are desirable. The nature of the policy advice on acidification was in turn inspired by the ideal of social planning as advocated by such leading economists as (Tinbergen 1952; Tinbergen 1954)—whose ideas are now seen as naïve by some (Nove 1983) and repugnant by others (Friedman and Friedman 1980). Harry Truman’s wish for a one-handed economist is now understood to be mistaken (Economist 2003). The notion of a dispassionate scientist passing objective advice to a benevolent policy maker has been thoroughly discredited (Funtowicz and Ravetz 1994; Pielke 2007).

Few would argue that the IPCC is a secret world government in waiting. The IPCC has set itself the more modest goal of standardizing the academic knowledge on which climate policy is based across the world.<sup>3</sup> This may be a mistaken goal. International negotiations succeed if all parties think they are better off (Barrett 1994; Carraro and Siniscalco 1998). There is no reason to believe that negotiations are easier if all parties share the same knowledge—in fact, the opposite may be true (Kamada and Kominers 2010; Ulph and Maddison 1997).

However, this paper is not about whether the IPCC was a mistake. The IPCC exists and it will not cease to do so in the foreseeable future. This paper is about how to regulate the IPCC. There are a number of earlier papers on this, mostly from people who are against climate policy (Alexander 2007; Dawson 2008; Dawson 2009; Henderson 2007; Henderson 2009; Peiser 2007; Zillman 2007) with a few exceptions (Solomon and Manning 2008; Terradas and Penuelas 2008). There is a substantial discussion on the much narrower topic of communication of uncertainty in IPCC reports (Budescu et al. 2009; Moss and Schneider 2000; Risbey and Kandlikar 2007b). In Section 2, I argue that the IPCC has a natural monopoly—regardless of the intentions of its founders, there can be only one IPCC-like organization. In Section 3, I discuss some of the problems typically found in monopolistic markets, in this case the market for climate policy advice, and illustrate this with examples from the IPCC, including its treatment of uncertainty. In Section 4, I present solutions. Section 5 concludes.

<sup>1</sup> Because greenhouse gas emission reduction is often (yet incorrectly) couched in terms of scientific necessity, opponents are led to attack the science and the scientific institutions. The debate was particularly vehement in the United Kingdom as the three main parties all called for stringent emission reduction, and the opposition was therefore unconstrained by (the prospect of) the responsibilities of government.

<sup>2</sup> The RAINS model, hosted at the International Institute for Applied Systems Analysis (Alcamo et al. 1990).

<sup>3</sup> <http://www.ipcc.ch/organization/organization.htm>

## 2 The IPCC as a natural monopoly

Natural monopolies occur when there are substantial economies of scale or scope, or when the costs of fixed capital are large (Baumol et al. 1982; Sharkey 1982). Railroads and electricity distribution networks are examples of the latter. The costs of laying tracks and cables are so high that it does not pay off to have two or three competing networks. One network is the maximum the consumer is willing to pay for, and a monopoly is the result. Economies of scale or scope are another reason for natural monopolies to form. Waste collection is an example. It is far cheaper to collect all rubbish in a street with a single truck than to let one truck serve some houses and another truck the remaining ones. Waste is therefore best collected by a (local, temporal) monopoly.

Strictly speaking, a monopoly is natural if the costs of having multiple providers are larger than the benefits of competition. As there are little data available, I cannot prove that the IPCC has a natural monopoly. Nonetheless, the IPCC shares some of the characteristics of a natural monopoly. There is large fixed cost of setting up a global organization to assess the literature on climate change to inform national and international policy. This cost is neither physical (e.g., water pipes) nor financial (e.g., equity), but rather in terms of reputation, trust and goodwill, and in terms of networks and institutional knowledge. It took the IPCC years to build up its current position. A new entrant in the market of climate policy advice would need a similar investment in quality and relationships before it can begin to compete with the IPCC.

The IPCC is also favoured by network economies. The IPCC relies on more-or-less voluntary contributions of the academics who serve as its authors. These authors are rewarded with prestige, networking opportunities, access to decision makers, and influence.<sup>4</sup> As the incumbent, the IPCC offers plenty of each. A new entrant would offer little. The IPCC is thus a natural monopsony on the input market for expertise.<sup>5</sup> As the IPCC ultimately derives its status as a policy advisor from the reputation of its contributors, this natural monopsony implies a natural monopoly.

So, the costs of establishing a competitor to the IPCC are high. The benefits would be small, as the would-be competitor would review the same literature and presumably reach roughly the same conclusions. Therefore, the IPCC has something that is akin to a *natural* monopoly.

## 3 Typical problems of monopolies

In the standard model, monopolies restrict supply to drive up the price and extract supernormal profits. Monopoly rents are readily detectable, and thus targeted by regulators. Regulated monopolies therefore often have excessive costs (e.g., large number of staff, high wages) or cross-subsidize another part of the same company—financed through the abuse of monopoly power. Monopolies may also reduce the quality of their product or service, while offering it at the same price. Monopolies also tend to innovate less—as there is no competition to stay ahead of. Such practices are harder to detect (Baumol et al. 1982; Sharkey 1982).

<sup>4</sup> IPCC authorship also offers opportunities to travel and earn per diems, which is particularly valuable to scholars from developing countries.

<sup>5</sup> Alternatively, one could see the IPCC as a club, and authorship as a club good. As the IPCC is the only significant club, this does not affect the reasoning below.

The root of the problem is that monopolies act in the interest of the company only, and that they can get away with it. Competitive firms too only consider their own bottom line—but they have to deliver good value to their clients lest they walk away.<sup>6</sup> Customers of monopolies cannot switch to a different supplier (by definition), and monopolies therefore do not need to heed their wishes to the same extent as a competitive firm does.

The IPCC is a knowledge monopoly, and it shares some of the characteristics of the behaviour of a typical monopolist. Obviously, the IPCC does not charge for its services, and therefore is not engaged in price gouging. The IPCC does not employ many people either, nor can it splash out on fancy offices. Authors and officials have used the IPCC to advance their own careers, but that would have happened in any case.

However, the IPCC does use its brand to branch out into areas outside its core mandate. While the IPCC was set-up to assess the research on climate change, it has also engaged in primary research on scenario building (Nakicenovic and Swart 2001), standard setting (Schimel et al. 1996), monitoring,<sup>7</sup> and research funding.<sup>8</sup> The IPCC is not particularly well-suited for these activities, and one may argue that it would have failed in these tasks had it not been for a cross-subsidy in kind (goodwill, reputation, trust).

The IPCC has moved into the territory of academia (e.g., MIT), UN agencies (e.g., UNEP) and Bretton Woods institutions (e.g., World Bank) with regard to scenario building, of the Subsidiary Body on Scientific and Technical Advice and the Secretariat of the UN Framework Convention on Climate Change with regard to standards and monitoring, and of public, private, and multilateral research financiers and capacity builders with regard to research funding.

The IPCC has used its monopoly power to branch out into scenario building. The resulting scenarios have been severely criticized (Castles and Henderson 2003a; Castles and Henderson 2003b; Girod et al. 2009; Gruebler et al. 2004; O'Neill et al. 2008; O'Neill and Nakicenovic 2008; Pielke et al. 2008), but AR4 glossed over the problems (Fisher et al. 2007). As complaints by referees were ignored, this can only be characterized as a deliberate misrepresentation of the literature—a violation of the IPCC mandate. Arguably, the IPCC used its role as an assessor of the literature to protect its role as a builder of scenarios.

The IPCC scenarios are more widely used than any of the alternatives. This is true for the climatological literature, the impact literature, and the emission reduction literature. This is partly because standardization of scenarios enables comparison of results and partly because the IPCC reports are more likely to refer to papers that use IPCC scenarios. A rational researcher would therefore use the dominant scenarios—that is, those of the IPCC. The scenarios run with the large-scale climate models are coordinated with the IPCC. Therefore, the IPCC has used its monopoly position in the market for assessment to establish a dominant position in the market for scenarios.

Some would say that the SRES scenarios (Nakicenovic and Swart 2001) and the associated controversy are old hat. Indeed, the IPCC is introducing new scenarios (Moss et al. 2010). Unfortunately, although there will be new scenarios and new acronyms, the same models will be used, repeating the same mistakes as were made before.

<sup>6</sup> Competitive firms and monopolies are thus aretaically and deontologically equivalent: Their motivation is the same and they respond in the same way to the same impulses. Their behaviour is different because their environment is different.

<sup>7</sup> <http://www.ipcc-nggip.iges.or.jp/>

<sup>8</sup> [http://www.ipcc.ch/ipcc-scholarship-programme/ipcc\\_scholarshipprogramme.html](http://www.ipcc.ch/ipcc-scholarship-programme/ipcc_scholarshipprogramme.html)

One may also argue that the quality of the IPCC reports has declined over time, another characteristic of a monopoly. This is hard to measure. AR4 certainly received far more negative attention than AR3—but that may also be because expectations have risen or the political climate has hardened. And parts of AR2 were strongly criticized too, on the “discernible human influence on global climate” (Edwards and Schneider 2001; Lindzen 1997) and on the monetary value of mortality risks (Bruce 1996; Courtney 1996; Grubb 1996; Pearce 1995a; Pearce 1995b; Pearce 1995c). The response of the IPCC to (alleged) errors in its emissions scenarios and the AR4, and to (alleged) conflicts of interest can be described as haughty (The Economist 2003a; The Economist 2003b; The Economist 2010a; The Economist 2010b), which may be inspired by the knowledge that the IPCC has captive clients.

The treatment of uncertainty is another sign of monopolistic behavior. The IPCC has spent an extraordinary amount of effort and time on guidance on how to treat uncertainty in its reports (Moss and Schneider 2000; Shapiro et al. 2010)<sup>9, 10</sup>—culminating in a rather thin and superficial guidance note.<sup>11</sup> There is an academic literature on this topic too (Budescu et al. 2009; Risbey and Kandlikar 2007a; van der Sluijs et al. 2010). Is this in the interest of the clients of the IPCC? The main purpose of the uncertainty guidance is to establish internal consistency. This is an obvious boon to the IPCC Bureau and Technical Support Units who need to read through the entire report, but less important to average reader who may carefully read one chapter and browse through a few others. The emphasis on internal consistency thus serves the organization rather than its clients. Clients of the IPCC are better served with external consistency and an honest appraisal of the uncertainties—and the IPCC falls short on that.

For instance, the AR3 concluded, with medium confidence, that the economic impacts of initial climate change would be beneficial (Smith et al. 2001). This was based on a single, published study. AR4 reached the same conclusion (Schneider et al. 2007), but with low confidence—even though a number of papers had been published that confirmed the beneficial economic impacts of modest climate change, and no studies that reached the opposite conclusion (Tol 2009). Both AR3 and AR4 followed the letter of the uncertainty guidance.

Finally, the IPCC has not innovated much. An author of AR1 would instantly recognize the methods, procedures, and structure of AR4. Things have changed, of course, but at the margin. This is perhaps the strongest sign that the IPCC is a monopoly. Since AR1, our understanding of the climate problem has changed dramatically. New technologies have emerged that drastically change the way people interact (e.g., blogs) and knowledge is disseminated and created (e.g., wikis)—while the internet brought access to unprecedented amounts of information. Yet, the IPCC still works with small teams of authors who fly to faraway cities to draft a chapter. Once finished, the chapter is fixed (Nature 2010). IPCC reports are the received wisdom flowing unidirectionally from the experts to the lay people (Beck 2010). The IPCC has largely avoided meta-analytical techniques, although the literature has grown fast since AR1 (Kuik et al. 2009; Parmesan and Yohe 2003; Root et al. 2003; Tavoni and Tol 2010; van den Bergh et al. 1997). For some IPCC chapters in AR4, none of the authors seemed to have had access to specialized academic databases and search tools.<sup>12</sup> The IPCC has made little use of tools for online collaboration and

<sup>9</sup> <http://www.ipcc-wg2.gov/meetings/CGCs/index.html>

<sup>10</sup> [http://www.ipcc.ch/meetings/session32/doc15\\_p32\\_report\\_cross\\_wg\\_mtg\\_cons\\_eval\\_uncert%20.pdf](http://www.ipcc.ch/meetings/session32/doc15_p32_report_cross_wg_mtg_cons_eval_uncert%20.pdf)

<sup>11</sup> <https://www.ipcc-wg1.unibe.ch/publications/supportingmaterial/uncertainty-guidance-note.pdf>

<sup>12</sup> For example, (Barker et al. 2007) find only one peer-reviewed paper on the impact of climate policy on employment while (Patuelli et al. 2005) find 94 papers.

communication, nor of transparency-enhancing software (e.g., automated versioning of documents).

#### 4 Regulating knowledge monopolies

It is often best to break up monopolies. However, this is not the case for natural monopolies. Natural monopolies should be regulated (Beck 2010; Berg and Tschirhart 1988; Train 1991; Waterson 1988). In Section 2, I argue (but cannot prove) that the IPCC has a natural monopoly. If so, the IPCC should be regulated rather than broken up.

Appropriate regulation of monopolies begins with the questions which part of the production and distribution process is a natural monopoly and why. In electricity, the network is a natural monopoly—but power generation and distribution and even network maintenance are contestable markets. Transaction costs may (have) justify (justified) vertical integration (in times past) (Tirole 2000), but are not necessarily offset by the welfare losses of a monopoly that is more extensive than needed.

There are three types of regulations that have been used to mitigate the negative effects of monopolies—that is, the regulator makes sure that the monopolist does not abuse its power. First, the conduct of monopolies is often tightly regulated. Price controls are a classic example.

Second, if there cannot be competition *in* the market, there can be competition *for* the market. Concessions for waste collection in a particular area or rail services on a certain line can be sold to the highest bidder. Concessions are temporary monopolies. If the company that won the concession does not perform well, another company takes over after a few years.

Third, monopolies are in principle threatened by new entrants. This argument is often made with regard to dominant ICT companies: a smart kid in a garage can revolutionize the sector. The regulator can therefore keep a monopolist in check by lowering the barriers to entry and by threatening to switch supplier.<sup>13</sup>

These types of regulations can be applied to the IPCC as well.

The IPCC has used its monopoly on assessment to establish a firm grip on a related field, that of long-term scenario building. And the IPCC has done a poor job (see above). The IPCC should withdraw from scenario development.<sup>14</sup>

With regard to standard setting, the IPCC has not been particularly forceful in pointing out the difficulties with global warming potentials (Godal 2003; O'Neill 2000; Shine et al. 2005; Smith 2003). While the IPCC is not responsible for the decision (2/CP.3) of the Conference of the Parties<sup>15</sup> to use the global warming potentials of AR2, the IPCC should loudly protest against this in AR5—in fact, it should have protested in AR3 and AR4.

The IPCC has spent considerable time and effort on matters that are primarily of concern to the IPCC itself, such as its guidance on uncertainty. The IPCC should commission a survey of the needs of its clients, broadly defined, and use the results to prioritize its efforts.

I am not aware of any issues with the IPCC's involvement in monitoring. The IPCC scholarship programme is brand new, but there is a risk that IPCC scholars will get

<sup>13</sup> This would not be a credible threat in the case of a natural monopoly and a benevolent regulator. It can be an effective threat if the monopolist is unsure about the true intentions of the regulator and the naturalness of the monopoly is debatable, as in the case of the IPCC.

<sup>14</sup> The Integrated Assessment Modeling Consortium, <http://www.iamconsortium.org/>, is a front organization of the IPCC, at least if it comes to scenario development.

<sup>15</sup> <http://unfccc.int/resource/docs/cop3/07a01.pdf>



preferential treatment in the selection of IPCC authors. It would therefore be better if the IPCC outsourced this to another organization.

Conduct regulation can help to improve outcomes in natural monopoly markets. At present, the IPCC is governed as follows.<sup>16</sup> IPCC Members meet once a year in a General Assembly. This is the meeting of the clients and sponsors of the IPCC, and its ultimate governing body. Day-to-day affairs are delegated to the IPCC Bureau, which combines the roles of an executive, a policy-maker, and an auditor.<sup>17</sup> The Bureau has three key advantages over the General Assembly: The Bureau has privileged access to information about the IPCC. Bureau members spend considerably more time and effort on the IPCC than do General Assembly members. And Bureau members, therefore, have more at stake than do General Assembly members. The Bureau thus has *de facto* the upper hand over the General Assembly, the *de jure* governing body.

This situation is not unique. National parliaments face the same problem in all aspects of regulation. Non-executive members of company boards are in the same situation. The standard solution is the creation of a regulatory agency, whose mandate is to check whether industry stays within the rules and, occasionally, whether the rules induce the desired outcome. Auditors fulfill this role in corporations. At present, such auditing of the IPCC is done through a number of *ad hoc* activities,<sup>18</sup> but this should be regularized.

The regulatory agency should audit the procedural aspects of the IPCC. However, it should also assess the performance of the IPCC, drawing on the experience with evaluating the performance of university departments. It could consider such issues as the selection of the IPCC authors.<sup>19</sup> Are they really top experts in their fields (controlling for geographical representation)? It could randomly select (parts of) IPCC chapters and see whether they truly reflect the balance of the literature—e.g., by comparison with recent survey articles. It should compare the outlines of IPCC report to the issues discussed in the literature, checking whether the IPCC gives undue weight to certain topics while ignoring other ones. It could monitor the impact of IPCC reports, both on the academic literature and on national and international policies.

As debates within the IPCC are often highly specialized and hard to follow for outsiders, the regulatory agency should make a particular effort to facilitate and protect potential whistleblowers.

The regulatory agency could be a body of the IPCC General Assembly, a joint venture of the mother organizations of the IPCC (the World Meteorological Organization and the United Nations Environment Programme), a permanent committee of the InterAcademy Council, or part of a newly established World Environment Organization. In the last cases, this regulatory agency could also supervise other international policy assessments. Care would need to be taken that the regulators are sufficiently independent.

At present, the people who control the IPCC are regularly replaced. One could therefore argue that there is already competition for the market. This is not the case, however. Competition for the market requires that there is competitive bidding between rival entities—and that the concession is awarded to the offer with the best price/quality characteristics. The

<sup>16</sup> <http://www.ipcc.ch/organization/organization.htm>

<sup>17</sup> The governance of the IPCC would be much improved if the IPCC Chair and Working Group Chairs would be removed from the IPCC Bureau to form a true executive; and the IPCC Bureau would be reformed as an independent board under a strong chair.

<sup>18</sup> For example, the review by the InterAcademy Council: <http://reviewipcc.interacademycouncil.net/>

<sup>19</sup> Note that the IPCC authors are nominated by governments. In a number of instances, governments have nominated people to the IPCC for their political colour rather than their expertise. The nomination process should be audited too, and the IPCC should have the right to appoint non-nominated authors too.



changing of the IPCC guard is done in backroom deals. In the future, there could be competitive bidding for the working group chairs and technical support units, as well as for the IPCC board. National governments have considerable domestic experience with this, and there are (imperfect) precedents at the international level as well: the Olympic Games and the FIFA World Cup.

A more radical alternative is the following. Rich IPCC members could pay an annual contribution, from which the technical support units are paid. Staff would be international, and less beholden to one particular sponsor government. The OECD, World Bank, and IMF operate in this manner.

Competition for the market could be extended further. If someone feels that there is a product missing from the range on offer by the IPCC, then that person should be allowed to bid for the use of the IPCC brand on such a report. Obviously, the report should meet the IPCC quality standards and comply with IPCC procedures. Currently, something similar is done through the IPCC Special Reports, but these originate from within the IPCC. There is no reason why the IPCC should not consider proposals for Special Reports from outside. In fact, allowing this would keep the authors and organizers of “regular” IPCC reports on their toes.

The prospect of competition, rather than competition itself, would also keep the IPCC on its toes. Unfortunately, this is not really an option. The international academies lack the resources, the mandate, and probably the ambition. Domestically, the national academies would be the logical choice to write a second opinion—but only the US National Academies<sup>20</sup> may have the resources to organize an assessment at the scale of the IPCC. Any national assessment would suffer from a lack of legitimacy in other countries—cf. the cool reception of the Stern Review (Stern et al. 2006) outside Europe.<sup>21</sup> Nevertheless, national assessments should be made widely available, e.g., by translation from Russian and Chinese to English.

While it would be hard for a single organization to compete with the entirety of the IPCC, competition on specific aspects is much easier. The World Meteorological Organization could review atmospheric science (WMO 2006), the World Health Organization the health impacts of climate change (McMichael et al. 2003; WHO 1990). The World Bank and the OECD could review the emission reduction policies and their costs (Bosi et al. 2010; Dellink et al. 2010), while national institutions could assess the impacts of climate change (Karl, Melillo, and Peterson 2009; BACC Author Team 2008). While such activities are ongoing, they often draw on the same people as the IPCC and are frequently not even intended to be independent.

The private sector would have the means, but the parties that would have the keenest interest to organize and finance an alternative assessment would suffer from a lack of trust for that very reason.<sup>22</sup> Publishers would be the exception. The IPCC reports have been a commercial success too, and competitors to its house publisher have no doubt been eyeing the same market. And there has indeed been somewhat of a proliferation of IPCC-like publications.<sup>23</sup> However, no full-blown alternative has been published (or is planned), but

<sup>20</sup> <http://dels-old.nas.edu/climatechange/>

<sup>21</sup> This may also be explained by the poor quality of the Stern Review (Arrow 2007; Mendelsohn 2006; Nordhaus 2007; Weitzman 2007).

<sup>22</sup> A poor example is the Non-governmental International Panel on Climate Change <http://www.nipccreport.org/>, while the Copenhagen Consensus on Climate is of higher repute (Lomborg 2010)

<sup>23</sup> For example, the Wiley Interdisciplinary Review on Climate Change <http://wires.wiley.com/WileyCDA/WiresJournal/wisId-WCC.html>, the Encyclopedia of Earth <http://www.eoearth.org/> and the Encyclopedia of Life Support Systems <http://www.eolss.net>

this may well happen should the IPCC lose more of its credibility. Climate policy makers should encourage these developments, but few if any do.

Self-organization is the third, potential new entrant that could threaten the IPCC's monopoly. Wikipedia is the best known example, and it already covers all the topics that the IPCC does. Wikipedia, however, lacks focus and it does not have the credibility and legitimacy of the IPCC. Many of the climate entries on Wikipedia are of low quality and balance is sometimes difficult to discern.<sup>24</sup> There have been attempts to create quality-controlled alternatives to Wikipedia aimed at academic audiences,<sup>25</sup> but these have not taken off—which is not to say that they could not. Any new wiki struggles with critical mass: Why would anyone contribute to something so small? For a climate wiki, this problem is easily overcome: Wikify AR4 and a few good textbooks. This would create critical mass. For the sake of competition, this should be supported. By way of experiment, this should be done by an IPCC-controlled wiki, a quality-controlled wiki (e.g., Scholarpedia), and an open wiki (e.g., Wikipedia).

## 5 Discussion and conclusion

The Intergovernmental Panel on Climate Change has a monopoly on the provision of climate policy advice at the international level and a strong market position in national policy advice. There is reason to believe that this was the intention of the founders of the IPCC. One can also make the case that the IPCC has a natural monopoly. A new entrant would have to make a considerable investment in time and effort over a number of years to try and match the reputation, trust, goodwill, and network of the IPCC. The IPCC is a not-for-profit organization run by nominal volunteers and therefore cannot engage in the price-gouging that is typical of monopolies. However, the IPCC has certainly extended its remit. Many have accused the IPCC of haughtiness. Internal concerns are prioritized over the wishes of clients. Innovation is slow. Quality may have declined. And the IPCC may have used its power to hinder competitors. These are all things that monopolies tend to do, and none of which is in the public interest. The IPCC would perform better if it were regulated by an independent body which audits the IPCC procedures and assesses its performance; if outside organizations would be allowed to bid for the production of IPCC reports and the provision of IPCC services; and if would-be competitors to the IPCC would be encouraged.

This paper is based on the concept that the IPCC is a supplier in the market for policy advice. Non-economists may well have a different perspective on the interface between science and policy and on the role of organizations like the IPCC in that process. It would be interesting to see whether that would lead to similar conclusions on the need and nature of IPCC reform.

PBL (2010) reviewed the contents of parts of AR4. It also recommends some procedural changes to the IPCC, particularly more staff to check drafts and a public log of errors. (Shapiro et al. 2010) review the procedural aspects of the IPCC. They recommend that an IPCC executive should be created (see footnote 14), that the position of review editors should be strengthened, that the IPCC should put more effort into communications, and that

<sup>24</sup> This is based on a reading of Wikipedia entries in areas of or adjacent to my expertise. Wikipedia has better quality with regard to mathematics and economics than for climate change. I have given up editing Wikipedia on issues relating to climate change.

<sup>25</sup> See for example <http://www.scholarpedia.org/> and <http://www.scitopics.com/>

the organization should become more transparent. While this would indeed improve the IPCC, these recommendations fall short of those derived here.

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